



NORTHERN HARDWOOD NOTES

Diameter Limit Cutting

Advantages

Diameter-limit cuts have been widely applied in northern hardwood forests, mainly because they are easy to apply in the field and they result in maximum financial returns.

Choosing trees to cut based on a diameter limit has the virtue of leaving smaller trees to reach fuller economic potential for future cuts. Based on observations and measurements in an array of diameter-limit cuts on the Argonne and Upper Peninsula Experimental Forests, reproduction and growth rates following limit cuts are generally good. Annual growth of board foot volume, however, was lower than other cutting methods because the trees were so small. *Diameter limit cutting is an even-age management option if the production of fiber is the sole objective.*

Disadvantage

The major disadvantage of this type of harvest cutting is that it does not provide for improving the quality of the future stand. If a strict diameter limit is followed, stand quality and growth rates may decline because small, low-quality and defective trees are not removed. Following heavy cutting, such as an 8-or 12-inch diameter limit cut, tree quality and merchantable lengths decrease with a lowering of crowns due to development of large branches following epicormic sprouting. *If developing high quality is an important management goal, diameter-limit cutting is not recommended.*

Other Considerations

When setting diameter limits, consider residual stand stocking, merchantability, quality, and cutting interval. For example, remember that only trees 16 inches d.b.h. and larger produce number 1 logs, and at least 70 square feet of saw log-size trees per acre are necessary to correct canopy forking and produce growth on high-quality stems.

The amount of residual growing stock obviously is affected by the intensity of the cut. A 12-inch-diameter-limit cut removed 90 percent of gross board foot volume in a mature stand on the Upper Peninsula Experimental Forest, while a 22-inch-diameter-limit cut removed only 29 percent. For practical purposes, an 8-inch-diameter-limit cut can be considered a commercial clearcut. Because of the low residual stocking (21 square feet in trees 4.6 inches d.b.h. and larger) in the 8-inch diameter-limit cut on the Argonne Forest, total growth per acre was reduced and the site was not fully utilized by growing stock for at least 6 years after the initial cut. Stocking was sufficient for a second cut (fiber only) approximately 30 years after the initial cut, but the quality potential of the stand was low.

Relating Stump Diameters to D.b.h.

Diameter limits are generally expressed as stump diameters. To convert stump diameter to d.b.h. for several common hardwood species, use the following formula:

D.b.h. = (stump diameter - a)/b where a and b are species values in the tabulation below:

| Species | a | b |
|----------------|----------|----------|
| Sugar maple | -0.2690 | 1.1041 |
| Basswood | -1.6374 | 1.2721 |
| Yellow birch | .7618 | 1.1987 |
| White ash | -.2995 | 1.1083 |

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